

# NATIONAL PETROLEUM COUNCIL

## COMMITTEE ON REFINING

### STUDY ON THE U.S. REFINING SECTOR IN THE 1990s

#### Progress Report to the National Petroleum Council

December 17, 1992

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The National Petroleum Council (NPC) began its current study on refining in late 1990 in response to a request from the Secretary of Energy. Admiral Watkins asked that the study focus on the impact of environmental regulation of refineries and petroleum products, stating:

I request that the NPC assess the effects of these changing conditions on the U.S. refining industry, the ability of that industry to respond to these changes in a timely manner, regulatory and other factors that impede the construction of new capacity, and the potential economic impacts of this response on American consumers. (The Secretary's complete request letter is attached.)

The Council expects to complete this study in early 1993. The required analytical tools have been developed, the necessary data collected, and the model running and analysis stage is nearing completion. Preparation has begun on a final report that will document and support the study's findings and conclusions.

#### Study Approach

To respond to the Secretary's request, the NPC established a Committee on Refining that decided on a two-phase approach to the study. The first phase focused on the impact of the Clean Air Act. The second phase is a broader and more detailed examination of the capabilities of the refining industry and the potential impact of the broad range of environmental initiatives and other issues facing refiners.

#### Phase I

This phase of the study was conducted in a six-month time frame. The Phase I report, entitled *Petroleum Refining in the 1990s – Meeting the Challenges of the Clean Air Act*, was presented and adopted at the June 1991 NPC meeting and then transmitted to the Secretary.

The report presents advice on efficient and effective ways to implement the motor gasoline and diesel fuel requirements of Title II of the Clean Air Act. The basis of the report is a series of interviews conducted for the NPC. Twenty leading refining companies, and five major engineering and construction firms, were interviewed by McKinsey & Company, Inc. The NPC analysis of the interview results led to conclusions and recommendations on several key EPA regulatory actions necessary to enhance the chances for successful compliance with the Clean Air Act. These conclusions and recommendations relate to 1992 oxygenated fuels in carbon monoxide nonattainment areas, to 1995 reformulated gasoline in ozone nonattainment areas, to 1993 on-highway diesel fuel desulfurization requirements, to timely permits for required modifications or new construction, and to post-1995 concerns.

## **Phase II**

This phase of the study is assessing the capability of the industry, both physically and economically, to produce the quantity and quality of products required in the 1990s and beyond.

The investment requirements and other costs associated with meeting the new environmental legislation and regulations on both refinery products and the refineries themselves are being considered. In particular, the requirements and impacts of the 1990 Clean Air Act Amendments and other environmental initiatives, both current and prospective, are being evaluated. Supply and distribution logistics and product differentiation are being reviewed.

A Coordinating Subcommittee and four task groups were established and are assisting the Committee in conducting Phase II of the study. (Rosters of the Committee, Coordinating Subcommittee, and task groups are attached.) An overview of their activities and assignments follows:

### Committee on Refining

The Committee, composed of Council members, provides overall guidance and direction to the study. It also reviews and approves all draft reports before they are submitted to the NPC membership as proposed final reports.

### Coordinating Subcommittee

The Coordinating Subcommittee's primary function is to provide coordination and consistency among the task groups. To that end, the Subcommittee meets almost monthly to review study progress and has developed a detailed list of study issues to be addressed. This list was developed from the Secretary's request letter, lists from various sections of DOE, and Subcommittee discussions. The Subcommittee also prioritized the issues and assigned task group responsibility for their analysis. Some cross-cutting issues such as alternative transportation fuels and capital availability are being handled by the Subcommittee on an ad hoc basis. Additionally, the Subcommittee is developing a report outline and will coordinate report preparation and approval at the working group level.

### Survey Task Group

The Survey Task Group has surveyed the industry as a service for the other task groups to help build an accurate picture of the current and anticipated future capability and flexibility of the nation's refining industry to supply its customers' needs.

The overall survey was divided into 10 sections, as outlined below:

- Perceptions of the impacts of regulatory requirements on the refinery's operations in 1995 and 2000
- Refinery facilities' capabilities and utilization, feedstocks, and product yields – actual 1990 data and as anticipated for 1995
- Refinery emission sources and controls
- Economic impacts of environmental regulations on refineries – both historical and anticipated costs
- Distribution and transport modes of products from refineries among national regions – 1990 and 1995

- Expectations regarding the 1995 supply and distribution of oxygenates, corporate-wide
- Various issues concerning terminals, including supply of product, capacity, and environmentally related costs
- Various issues concerning pipelines, including capacity, product segregations, and costs
- Tanker, barge, rail, and truck transport costs
- Foreign refinery and supply issues, including likely product specifications in other nations in 1995 and 2000.

A separate questionnaire on the supply and distribution of oxygenates was sent to companies that blend oxygenates with petroleum products but do not produce petroleum products.

The survey questionnaire development was a joint effort by all the task groups. They examined past surveys and constructed a new, broader survey. SRI International was retained to assist in the questionnaire development and to collect, aggregate, and protect the confidentiality of the survey responses.

The survey was sent out in November 1991 with a January 31, 1992 return date. The survey response represents more than 150 refineries with 90 percent of the U.S. refinery distillation capacity. It provides an excellent data base from which to conduct the study's analyses. SRI has aggregated the survey data in the manner requested by the task groups.

#### Refinery Facilities Task Group

The Refinery Facilities Task Group is charged with assessing the impact of current and future regulations on refineries. A list of the issues/responsibilities being addressed by the Task Group follows:

- Current and future regulations
- Permitting
- Investment for environmental controls
- Process safety management
- Investment for process facilities
- Location cost differentials.

This Task Group, with the help of an expert panel on environmental issues, has developed a detailed list of potential significant regulations affecting refining in three categories:

- Air regulations
- Water and waste regulations
- Health and safety regulations.

Bechtel Corporation has been retained to develop estimates, by refinery size, of investment and operating costs that would result from such regulations. Block flow diagrams have been developed presenting process configurations, supporting facilities, and utility systems for nine refinery size groupings.

The Refinery Facilities Task Group has also developed data needed to ensure consistent investments and operating costs throughout the study. Costs for typical new process facilities and location cost differentials have been developed.

#### Product Quality and Refinery Capability Task Group

The Product Quality and Refinery Capability Task Group is charged with assessing the cost and impact of more stringent product regulation. A list of the issues/responsibilities being addressed by the Task Group follows:

- Aggregated industry modeling for costs and capabilities

- Cost and capability of domestic light product supply by refining region
- Seasonal impact on domestic supply capability
- Costs and impact of more stringent product regulation
- Impact on segments of refining industry
- Impact of alternative fuels/other gasoline demand reductions on refinery production.

Turner, Mason & Company has been retained to provide modeling support in analyzing the capability of the domestic refining industry to provide required products under a variety of different product specification assumptions. In addition, Pace has been retained as a modeling contractor to generate U.S. cost/volume curves for use in the supply, demand, and logistics data integration modeling effort. The Task Group has developed methodologies, premises, and other input assumptions for its models and analyses.

### Supply, Demand, and Logistics Task Group

The Supply, Demand, and Logistics Task Group's primary assignment is to coordinate data integration and to assess the sources of U.S. product supplies regionally under a variety of potential conditions. A list of issues/responsibilities being addressed by the Task Group follows:

- Crude oil supply and product demand scenarios
- Crude oil quality changes
- Product exports and imports
- Cost and capability of foreign light product supply by refining region
- Foreign environmental regulation projections
  - Refinery
  - Products
- Ethers and ethanol production and supply, worldwide
- Supply, distribution, and logistics system changes for the Clean Air Act era
- Comparative position of domestic refining industry
- Data Integration Model to assess impact of all of above on U.S. refining industry utilization and source of light products for U.S. customers.

The Task Group has divided the United States into 13 supply/demand regions for analytical purposes and is also examining potential imports into the U.S. from 6 foreign refining regions.

Also, three analytical foundation cases have been developed to represent demand in the U.S. for petroleum products covering the years 1995, 2000, and 2010:

- An increasing demand case from DOE's Energy Information Administration's Annual Energy Outlook
- A no-growth demand case
- A declining demand case for all products.

Product supplies will be evaluated under these foundation and various sensitivity cases.

Bonner & Moore Associates, Inc. has been retained as a contractor to provide a transportation/logistics model for such purposes. In addition, The Pace Consultants, Inc. has been retained as a modeling contractor for developing cost/volume curves on foreign product supply for input to the Bonner & Moore model. Valuable insights on foreign refining issues were provided by expert panel discussions hosted by the Task Group's Foreign Subgroup. Numerous other input assumptions for both models are being developed by this and the other task groups.

### **Current Status and Schedule**

The primary Phase II study activities have been:

- Study issue development
- Survey questionnaire development
- Survey data aggregation plans
- Model development
- Assumption development
- Alternative transportation fuels literature review
- Working with contractors to ensure a suitable survey, data, and models
- Study analyses
- Report preparation.

The study's critical analytical stage is nearing completion. This has involved analyzing the survey data, running and analyzing the results of the models previously described, and conducting other analyses. The study's last stage, the preparation of a proposed final report, is underway with completion for the Spring of 1993.